

CABLE RETRACTOR FOR AN ELECTRONIC DEVICE

Field of the Invention

The present invention relates to a cable retraction assembly for use in a device such as a cell phone, or other related communications device or any device for delivering audio information.

Background of the Invention

Portable electronic devices such as AM/FM radios, cassette player, CD players, and MP3 players may utilize an earpiece at the end of a flexible cable to allow the user to listen to the radio or prerecorded music without disturbing surrounding people. Some earpieces also incorporate a microphone for use with a wireless phones. These earpieces come in many different sizes and configurations and are available at different price points and quality levels. Many users attach these portable electronic devices about their waistline and listen through the earpiece. The earpiece is coupled to the portable electronic devices with a predetermined length of cable.

A problem with these earpieces is that no one predetermined length of cable is right for each user and activity. In order to ensure there is enough cable length for every person and activity, the manufacturers typically provide an overly long cable. If a user finds that the length of cable is too long for his or her activity, the user must somehow reduce the amount of slack. The user can eliminate the slack by wrapping a portion of the cable around the electronic device until the appropriate length of cable remains or the user can coil the cable leaving an appropriate length of cable and secure the coil with tape or string. Both of these known methods do not allow the user the freedom to easily adjust

Brief Description of the Drawings

Figure 1 is a front view of a wireless phone;

Figure 2 is a bottom view of the cordless phone of Figure 1 and various peripherals;

Figure 3 is front view of a first embodiment of a cable retractor assembly consistent with the present invention;

Figure 3A is a front view of the cable retractor assembly of Figure 3 coupled to the wireless phone of Figure 1;

Figure 3B is a side view of a second embodiment of a cable retractor assembly consistent with the present invention coupled to the wireless phone of Figure 1;

Figure 4 is a first section view of the cable retractor assembly taken along line 4-4 of Figure 6;

Figure 5 is a second section view of the cable retractor assembly taken along line 4-4 of Figure 6;

Figure 6 is a bottom view of the cable retractor assembly of Figure 3;

Figure 7 is a first right side view of the cable retractor assembly of Figure 3;

Figure 8 is a second right side view of the cable retractor assembly of Figure 3;

Figure 9 is a sectional view of the cable retractor assembly taken along line 9-9 of Figure 3;

Figure 10 is a partial section view of a cable retractor consistent with the present invention; and

Figure 11 is a top view of a first embodiment of a biasing member consistent with

1 the present invention.

2 The above and other objects, feature, and advantages of the present invention will
3 be apparent in the following Detailed Description of the Preferred Embodiments thereof
4 when read in conjunction with the appended drawings wherein the same reference
5 numerals denote the same or similar parts throughout the several views.

6 Detailed Description of the Preferred Embodiments

7 Figure 1 shows a front view of a wireless phone 10 with a speaker 22 and a
8 microphone 24. Typically, the user holds the phone 10 in one hand, listens through the
9 speaker 22, and talks into the microphone 24. The phone 10 can also be used in
10 conjunction with a combined speaker/microphone earpiece 14 (see Figure 2) coupled at
11 the distal end of a cable 12 or 12'. The combined speaker/microphone earpiece 14 can be
12 inserted in a user's ear. The combined speaker/microphone earpiece 14 picks up the
13 sound of the user's voice from the vibrations of their jawbone. A combined
14 speaker/microphone earpiece is available from M-squared Inc. under the name
15 EARTHUGGER®. The proximal end of the cable 12 may include a jack 20 for insertion
16 into a receptacle 16 in the base of the phone 10 as shown in Figure 2. Alternatively, the
17 jack 20 can be coupled to the phone 10 using a connector 26. The proximal end of the
18 cable 12' may include a connector 26' for coupling to the phone 10

19 Conductors enclosed in the cables 12 and 12' extend from the proximal end to the
20 distal end. The combined speaker/microphone earpiece 14 allows the user to carry on a
21 hands free conversation while the phone is secured about the user's waist.

22 Alternatively, a speaker earpiece 14A can be located at the distal end of the cable

one of an AM/FM radio, a CD player, an MP3 player, a cassette player, a personal digital assistant, a computer, a cordless phone, a radiophone, and a cellular phone.

Figure 3A shows the cable retractor assembly 100 coupled to the wireless phone 10 of Figure 1. The cable retractor assembly 100 is shown extending generally downward from the base of the phone 10.

Figure 3B shows a second embodiment of a cable retractor assembly 100' coupled to wireless phone 10 of Figure 1, the cable retractor assembly extending generally rearward of the phone 10. The cable retractor may optionally include a clip 190 for securing the retractor and phone to a user's belt or waistline.

As shown in Figures 3, 4, 5, and 6, the cable retractor assembly 100 is shown in an enclosure 102. The cable retractor assembly 100 comprises a plurality of terminals 118 for electrically coupling the cable retractor assembly 100 to a portable electronic device, a printed circuit board 150 with conductive traces for coupling various electrical and mechanical components including the terminals 118 and 18B, a rotatable reel 120 for reeling a length of a cable 112 with a combined speaker/microphone earpiece 114 or speaker earpiece 114A and microphone 132, a biasing member 246 (see Figure 11) for causing the reel 120 to rotate in a predetermined direction, a combined speaker/microphone earpiece 114, a locking mechanism 106 for resisting winding and unwinding of the cable 112, a pair of mechanical fasteners 130 for securing the enclosure 102 to a portable electronic device, and a release mechanism 162 for releasing the cable retractor from a portable electronic device.

The mechanical fasteners 130 can be designed to give the user the ability to

1 Alternatively, the cable retractor assembly comprises an actuator 172. The
2 actuator may be electrically coupled through the printed circuit board to terminal 118 on
3 the topside of the enclosure 102. In the event the coupled wireless phone 10 receives an
4 incoming call, the user can simply actuate the actuator 172 to pick up the incoming call.

5 Alternatively, the cable retractor assembly comprises a sensor 176 for sensing
6 movement of the cable 112 or rotation of reel 120. The sensor may be a Hall effect
7 sensor or an optical sensor secured to a printed circuit board 150. Methods for sensing
8 motion are well known in the art. When motion or rotation is sensed, the coupled
9 wireless phone can be signaled through terminals 118. In the event the coupled wireless
10 phone 10 receives an incoming call, the sensed movement or rotation can signal the
11 wireless phone to pick up the incoming call.

12 Alternatively, the cable retractor comprises an actuator 174 coupled to the printed
13 circuit board that may be actuated by the earpiece 114 or 114A when the earpiece is
14 inserted in a cradle 116 on the enclosure 102. When the state of the actuator 174 is
15 changed by removal of the earpiece from the cradle, the coupled wireless phone can be
16 signaled through terminals 118 to pick up an incoming call.

17 Alternatively, the cable retractor assembly 100 may monitor whether the
18 combined speaker/microphone earpiece 114 or speaker earpiece 114A and microphone
19 132 are extended outside the enclosure 102. When the cable retractor assembly 100 is
20 coupled to a wireless phone or built into a wireless phone, the wireless phone can be
21 programmed to disable the ringer on the phone whenever the combined
22 speaker/microphone earpiece 114 or speaker earpiece 114A and microphone 32 is

1 the locking mechanism 106 upward to the position shown in Figure 8. The cable 112
2 extends from the reel 120 along a passageway 162 and exits the enclosure 102 through an
3 opening 160. The passageway 162 and the opening 160 can be sized to allow the
4 microphone 132 to be retracted inside the enclosure 102 when used with the speaker
5 earpiece 114A. By urging the locking mechanism 106 upward, the locking mechanism
6 106 compresses the cable 112 against the side of opening 160. An alternative locking
7 mechanism can resist motion of the cable 112 by resisting rotational motion of the reel
8 120.

9 In the embodiment shown in Figures 4 and 5, the reel 120 is urged to rotate
10 clockwise by a biasing member 246 (shown in Figure 10 and 11). In this embodiment,
11 the biasing member 246 constantly urges the reel to rotate. Alternatively, the combined
12 speaker/microphone earpiece 114 or speaker earpiece 114A can be secured in a cradle on
13 the exterior of the enclosure 102. The earpiece and the cradle can be designed to allow
14 the earpiece to snap into the cradle. Alternatively, the earpiece and the cradle can be
15 designed to require that the earpiece be rotated, for example 90°, prior to removal from
16 the cradle.

17 In an alternative embodiment, the cable retractor assembly 100 includes a ratchet
18 and pawl mechanism and a release mechanism 180. As the user urges the combined
19 earpiece/mouthpiece 114 or speaker earpiece 114A from the enclosure 102, the ratchet
20 prevents the cable 112 from being retracted into the enclosure 102 when the user releases
21 the earpiece or the cable 112. By actuating the release mechanism 180, the cable 112 is
22 retracted on to the reel 120. Many different types of suitable ratchet mechanisms and

1 release mechanisms can be coupled to the reel 120 or cable 112. Ratchet mechanisms
2 and release mechanisms are well known to those in the art, a detailed explanation will
3 therefore be omitted. U.S. Patent 6,059,213 entitled Reel Device discloses a ratchet and
4 pawl mechanism and a release mechanism suitable for use in the present invention. The
5 '213 patent is incorporated herein by reference in its entirety.

6 As shown in Figure 6, the cable retractor 100 may include a plurality of terminals
7 18B and openings 28A on its base. The terminals 18B can be electrically coupled to the
8 terminal 118 located on the topside of the enclosure 102 through the printed circuit board
9 150. These terminals on the base of the cable retractor allow the portable electronic
10 device to be coupled with other devices without having to remove the cable retractor 100
11 from the portable electronic device. The terminals 18B allow the battery in the portable
12 electronic device to be charged when the phone 10 is inserted in a charger, allow the user
13 to insert the phone 10 in a cradle for use in a hands-free car phone set up, and allow the
14 phone to send and receive data to other devices. Openings 28A allow other devices to be
15 mechanically coupled to the cable retractor assembly 100.

16 A detailed cross-sectional view of the cable retractor assembly 100 consistent with
17 the present invention is shown in Figure. 9. A reel 120 is rotatably mounted within a
18 cavity 232 within the housing 102. More specifically, the side 231 of the reel 120 is
19 provided with a hole 234 acting as a sleeve, which receives a hub 236 extending inwardly
20 from side 216 of the housing 102. A screw 240 passes through a hole 280 in the side 214
21 of housing 102 into the hub 236 to provide a pivotal axis for rotation of the reel 120.

22 The reel 120 is constructed with a spool wall 244, preferable circular in shape,

1 flat sheet of copper of 0.062 inch in width and 3 mils (1/1000 inch) in thickness. The two
2 (2) telephone wires are arranged parallel and side-by-side with a spacing of 100 centers,
3 and then laminated between two (2) pieces of MYLAR of 2 mils thickness with a hot glue
4 adhesive sprayed on the inside surfaces of the MYLAR prior to the lamination step. To
5 this assembly a laminating pressure is applied which causes the copper wires to adhere to
6 the MYLAR, which in the assembly acts as an insulator. Additional conductor may be
7 provided if necessary. U.S. Patent 5,241,593 entitled Telephone and Telephone Cord
8 Retraction Device and Method of Making discloses a suitable retractor coil for use in the
9 present invention, the '593 patent is herein incorporated by reference in its entirety.

10 It should be understood that, while the present invention has been described in
11 detail herein, the invention can be embodied otherwise without departing from the
12 principles thereof, and such other embodiments are meant to come within the scope of the
13 present invention as defined in the following claim(s):
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